

GONODACTYLUS INSULARIS, A NEW STOMATOPOD
CRUSTACEAN FROM ENEWETAK ATOLL,
PACIFIC OCEAN

Raymond B. Manning and Marjorie L. Reaka

Abstract.—The ninth species of the *G. falcatus* complex in the Indo-West Pacific region is recognized. Like other species of the complex, it can be distinguished in the field by its color pattern.

Until relatively recently, *Gonodactylus falcatus* (Forskål, 1775) was considered to be one of the two most widely distributed members of the genus in shallow water habitats in the Indo-West Pacific region, ranging from the Red Sea and East Africa eastward to Hawaii and Japan. Field studies conducted by R. L. Caldwell, University of California, H. Dingle, University of Iowa, and their colleagues, including one of us (MLR), strongly suggested that *G. falcatus* actually was a complex of species sharing many morphological features as well as habitat preferences, but differing in size, behavior, and color in life. Reexamination of type-specimens of taxa considered to be junior synonyms of *G. falcatus* resulted in the recognition of five species (Manning 1978), and two species have been described since then (Manning and Reaka 1981a, b). The other member of the complex, *G. graphurus* Miers, 1875, from Australasian localities, is distinctive morphologically (Manning 1978:fig. 2) and has not been confused with other members of the complex in the recent literature.

We name here the ninth species of the complex, based upon specimens collected at Enewetak Atoll. All specimens have been deposited in the collections of the National Museum of Natural History, Washington, under USNM catalogue numbers.

We thank C. W. Hart, Jr., Smithsonian Institution, and Austin B. Williams, Systematics Laboratory, National Marine Fisheries Service, for their comments on the manuscript. Philip Helfrich facilitated field work by one of us (MLR) at the Enewetak Marine Biological Laboratory in 1972 with a grant from that institution.

Gonodactylus insularis, new species

Fig. 1

Gonodactylus falcatus.—Manning, 1971:73, 74.—Reaka, 1975:56; 1976:484 [discussion]; 1979:238, 248, 249, 252, figs. 2-4.—Dingle et al., 1973:55, 58, 59, 62, table 2.

Material.—Kidrenen [Keith or Grinem] Island, Enewetak, 11°22'50"N, 162°10'30"E, lagoon side, scattered small coral heads on bottom of coral sand at 75 feet, C. A. Child, sta. 7-69, 23 September 1969: 1 female (holotype, USNM 135632).—Enewetak, 1971(?), coral rubble, 0-1 meters, R. L. Caldwell: 2 females (paratypes, USNM 139883).—Enewetak, Aomon (Sally) Island, coral rubble, 1-

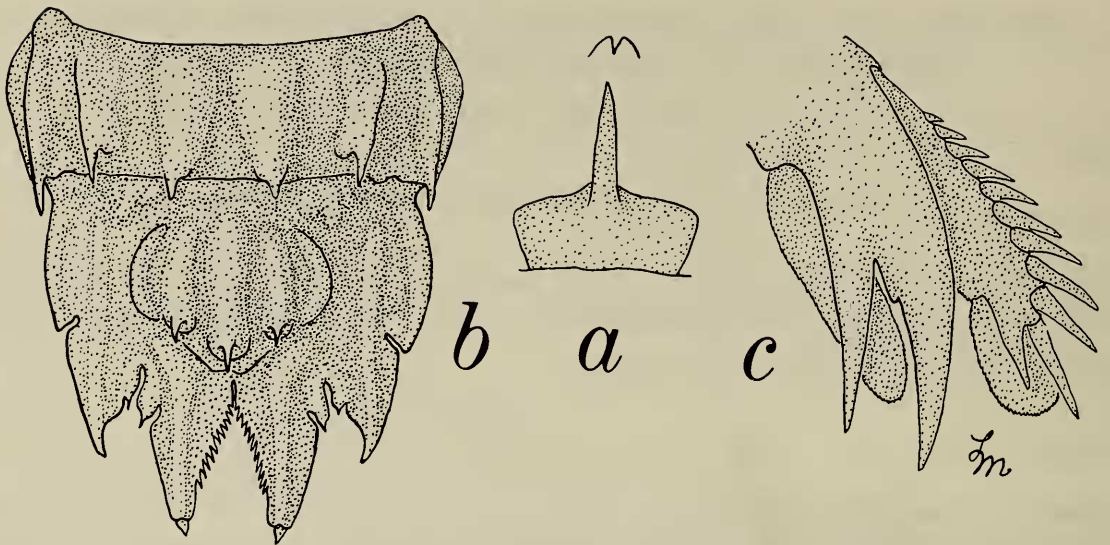


Fig. 1. *Gonodactylus insularis*, female paratype, total length 31 mm: a, Rostral plate and ocular scales; b, Sixth abdominal somite and telson; c, Uropod, ventral view.

3 meters, 1972, M. L. Reaka: 3 males, 10 females (paratypes, USNM 189383).—Sand Island, Enewetak, R. L. Caldwell *et al.*, August 1971: 6 males, 5 females (USNM 189384).

Description.—Rostral plate with length and width subequal or slightly longer than broad, median spine relatively short, anterior margins of basal part of plate at right angles to body line or sloping anteriorly, lateral margins divergent, anterolateral angles acute but rounded. Ocular scales small, breadth of each no greater than that of rostral spine at base. Anterior 5 abdominal somites lacking transverse grooves, sixth somite with 6 carinae, variously inflated, each usually with strong posterior spine; median carinule absent. Small black spot usually present on each side of sixth somite between submedian and intermediate carinae. Abdominal width/carapace length index ranging from 882 in smaller specimens to 740 in larger ones. Telson appearing elongate because of slender marginal teeth, length and width subequal or width slightly greater. Dorsal carinae of telson slender or moderately inflated, median and accessory medians each usually with strong apical spine flanked ventrally by strong excavation. Knob distinctly bilobed. Three pairs of marginal teeth present, submedians with movable apices; apices of intermediate teeth slender, sharp, curved mesially; lateral teeth shorter, blunter. Anterior surface of telson with dark spot on each side anterior to each anterior submedian carina. Ventral surface of telson with sharp carina on each submedian tooth. Uropodal exopod with single line of marginal setae, exopod with 9–12, usually 11, graded movable spines on outer margin of proximal segment; basal prolongation with one rounded lobe proximally on inner margin of outer spine.

Color.—Body of both sexes similar, greenish or brownish, heavily speckled or mottled, lacking red posterior bands on abdominal somites in both sexes. Antennal scale variable in color, clear, red, yellow, orange, yellow-green, or blue-green, often (but not always) with white, blue-white, or blue patches or speckles, usually with pink or red edges; two specimens (both females) with base of scale red, and tip blue or blue-green. Meral spot yellow with anterior reddish infusion, not

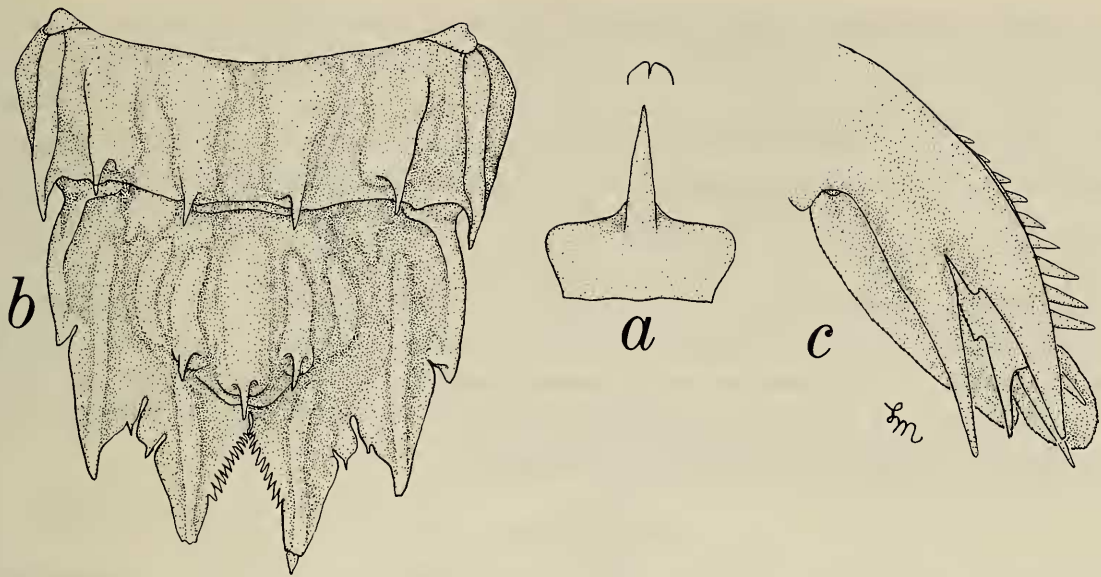


Fig. 2. ?*Gonodactylus insularis*, female, total length 39 mm, Onatoo: a, Rostral plate and ocular scales; b, Sixth abdominal somite and telson; c, Uropod, ventral view.

variable; smaller flanking spots as follows: dorsal posterior spot blue-green and black (not variable); dorsal anterior crescent variable, blue-green, brown, or clear; anterior spot variable, black, red, or brown; ventral spot green or brown, variable. Other maxillipeds variable in color, green, or blue-green, or usually yellow or yellow-green with pink front edges. Pereopods variable, sexes essentially similar, merus variably greenish or yellow or pink with white splotches, distal two segments red or pink; some individuals (both male and female) with bluish coloration on pereopods. Uropods similar in both sexes, not variable, endopod and exopod red or pink with white mottling or spots, setae red.

Measurements in mm.—Total lengths of males 13 to 30, of females 10 to 31.5. Other measurements of female holotype: carapace length 7.3; rostral plate length 2.4, width 2.4; fifth abdominal somite width 5.5; telson length 4.5, width 4.5.

Reaka (1979:252, table 7) noted that at Enewetak this species settled at a length of 8 mm, was 13 mm long at sexual differentiation, reached reproductive maturity at 31 mm, and had a maximum size of 34 mm.

Remarks.—This new species resembles three of the species of the *G. falcatus* complex that have a bilobed knob on the telson and that lack a median carinule on the sixth abdominal somite and for which color in life is known: *G. aloha* Manning and Reaka, 1981, from Hawaii, and *G. mutatus* Lanchester, 1903, and *G. siamensis* Manning and Reaka, 1981, both from Thailand. The most striking differences among these species are their color patterns in life. The diagnostic meral spot in *G. insularis* is basically yellow, as in these three other species, but the anterior infusion is reddish whereas it is brown in *G. aloha*, *G. mutatus*, and *G. siamensis*. *Gonodactylus insularis* lacks posterior red bands on any of the abdominal somites in either sex; these are also absent in *G. mutatus*, but are present in males of *G. aloha* and *G. siamensis*. The uropodal endopod in *G. insularis* is red or pink with white spots and red setae; in *G. aloha* they are pinkish-orange with yellow distally and green or pink setae. The uropod color has not been reported in *G. mutatus*.

Gonodactylus insularis differs from both *G. mutatus* and *G. siamensis* in having narrower carinae with relatively long posterior spines on the median and accessory carinae on the telson, and much sharper, more slender intermediate marginal teeth on the telson. These features of the telson are so distinctive that we tentatively identify with this species two females, 27.5 and 39 mm long, from Onotoa, Gilbert Islands (Fig. 2). *Gonodactylus insularis* may well prove to frequent other oceanic islands in the Pacific.

Nothing is known of the color pattern of *G. glabrous* Brooks, 1886, from the Philippines and Indonesia, but it is a larger species, 50 to 51 mm long, and the teeth and spines of the telson are all slender and sharp (Manning 1978:fig. 3).

The abdominal width/carapace length indices of *G. insularis*, like those of *G. siamensis*, are somewhat variable, as follows:

Carapace length, mm	No. of specimens	Enewetak (all but Sand Island) Index		Sand Island Index	
		Range	Mean	Range	Mean
3	3	794–824	814	882	882
4	2	800–806	803	821–875	848
5	2	800–820	810	784–849	817
6	3	764–797	783	—	—
7	1	753	753	821	821

It seems likely from the abdominal width/carapace length indices given above that the specimens from Sand Island represent a separate species. Samples from Sand Island, an apparently temporary emergent island between Enewetak (Fred) and Parry islands, on the southeastern quadrant of the atoll, were collected by R. L. Caldwell and colleagues in 1971. When researchers returned to Enewetak in 1972, Sand Island and its population of *Gonodactylus* no longer existed.

In the 1971–1972 Annual Report of the Enewetak Marine Biological Laboratory, R. L. Caldwell and H. Dingle reported that they found three species of gonodactyloids on Sand Island, one of which was referred to as *Gonodactylus* sp. Dingle et al. (1973:58) reported on their collections from 1971, and noted: “*G. falcatus*, on the other hand, when we did find it, occupied rubble that was conspicuous for the attached overgrowing clumps of green algae.” They also noted that coral rubble fragments with attached green algae were uncommon on Sand Island, possibly a reflection of the scarcity of the species they identified with *G. falcatus*.

Without information on color in life of the population from Sand Island, we are reluctant to characterize it as a species distinct from *G. insularis* proper. In view of this, we tentatively identify the sample from Sand Island with *G. insularis*, but do not consider those specimens as paratypes.

The holotype, the largest specimen available, appears to be conspecific with the remainder of the type-series. However, unlike the remainder of the specimens, which were collected in relatively shallow water, the holotype was collected at a depth of 75 feet. Whether the species actually occurs from the shallow intertidal to that depth or whether the holotype washed to that depth is unknown.

Etymology.—The specific epithet is from the Latin, “insularis”, of an island.

Literature Cited

- Dingle, Hugh, R. C. Highsmith, K. E. Evans, and Roy L. Caldwell. 1973. Interspecific aggressive behavior in tropical reef stomatopods and its possible ecological significance.—*Oecologia* 13:55–64.

- Manning, Raymond B. 1971. Two new species of *Gonodactylus* (Crustacea, Stomatopoda), from Eniwetok Atoll, Pacific Ocean.—Proceedings of the Biological Society of Washington 84:73–80, figures 1, 2.
- . 1978. Notes on some species of the *Falcatus* Group of *Gonodactylus* (Crustacea: Stomatopoda: Gonodactylidae).—Smithsonian Contributions to Zoology 258:1–15, figures 1–13.
- , and Marjorie L. Reaka. 1981a. *Gonodactylus aloha*, a new stomatopod crustacean from the Hawaiian Islands.—Journal of Crustacean Biology 1(2):190–200, figures 1–3.
- , and ———. 1981b. *Gonodactylus siamensis*, a new stomatopod crustacean from Thailand.—Proceedings of the Biological Society of Washington 94(2):479–482, figure 1.
- Reaka, Marjorie L. 1975. Molting in stomatopod crustaceans, I. Stages of the molt cycle, setagenesis, and morphology.—Journal of Morphology 146(1):55–80, figures 1–25.
- . 1976. Lunar and tidal periodicity of molting reproduction in stomatopod Crustacea: a selfish herd hypothesis.—Biological Bulletin 150:468–490, figure 1.
- . 1979. The evolutionary ecology of life history patterns in stomatopod Crustacea. Pp. 235–260 in S. E. Stancyk (editor), Reproductive ecology of marine invertebrates.—University of South Carolina Press: Columbia.

(RBM) Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560; (MLR) Department of Zoology, University of Maryland, College Park, Maryland 20742.